

Energy Transfers in a System

Question Paper

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.1 Energy
Sub-Topic	Energy Transfers in a System
Difficulty Level	Gold Level
Booklet	Question Paper

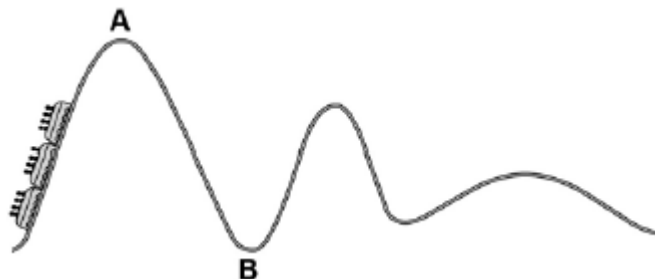
Time Allowed: 19 minutes

Score: /18

Percentage: /100

Grade Boundaries:

Q1. The figure below shows a rollercoaster.



The rollercoaster car is raised a vertical distance of 35 m to point **A** by a motor in 45 seconds.

The mass of the rollercoaster is 600 kg.

The motor has a power rating of 8 000 W.

- (a) Calculate the percentage efficiency of the motor.

Gravitational field strength = 9.8 N / kg.

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Efficiency = %

(5)

- (b) The rollercoaster rolls from point **A** to point **B**, a drop of 35 m.

Calculate the speed of the roller coaster at point **B**.

Assume that the decrease in potential energy store is equal to the increase in kinetic energy store.

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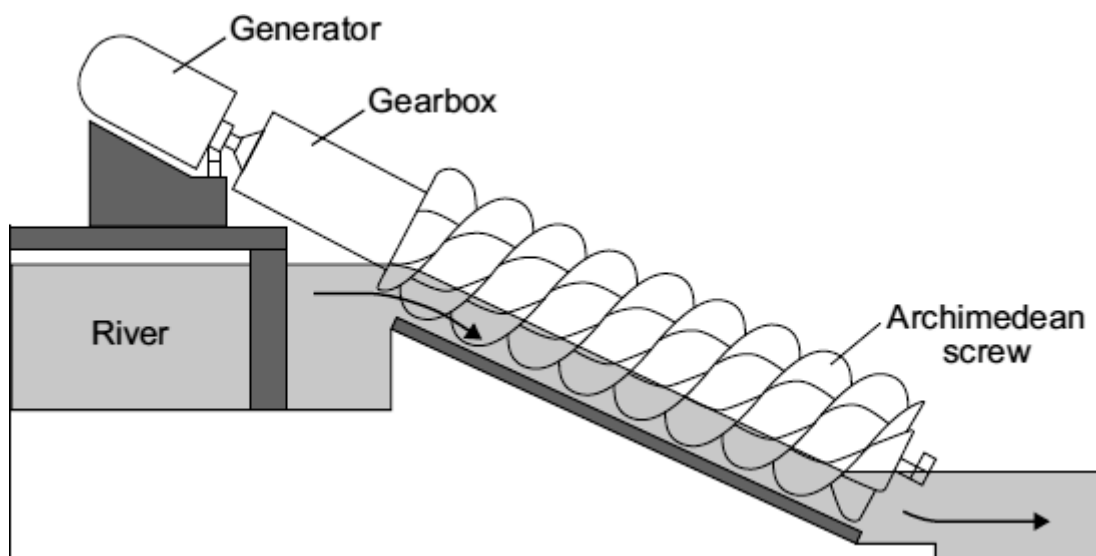
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Speed at point **B** = m / s

(6)
(Total 11 marks)

- Q2.** The diagram shows a small-scale, *micro-hydroelectricity* generator which uses the energy of falling river water to generate electricity. The water causes a device, called an Archimedean screw, to rotate. The Archimedean screw is linked to the generator by a gearbox.



- (a) Each second, the *micro-hydroelectricity* generator transforms 80 000 joules of gravitational potential energy into 60 000 joules of electrical energy.
- (i) Fill in the missing word to complete the energy transformation diagram.



(1)

- (ii) Use the equation in the box to calculate the efficiency of the *micro-hydroelectricity* generator.

$\text{efficiency} = \frac{\text{useful energy transferred by the device}}{\text{total energy supplied to the device}}$

Show clearly how you work out your answer.

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Efficiency =

(2)

- (b) The power output from a conventional large-scale hydroelectric power station is 100 000 times more than the power output from a micro-hydroelectric system.

Give **one** disadvantage of a conventional large-scale hydroelectric power station compared to the micro-hydroelectric system.

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(1)

- (c) The electricity generated by a micro-hydroelectric system is transferred via a transformer directly to local homes. The electricity generated by a conventional large-scale hydroelectric power station is transferred to the National Grid, which distributes the electricity to homes anywhere in the country.

- (i) What is the National Grid?

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(1)

- (ii) Explain why transferring the electricity directly to local homes is more efficient than using the National Grid to distribute the electricity.

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(2)
(Total 7 marks)